Skipping Science: An Experiment in Jump Rope Lengths

Abstract

Did you know that the United States jump rope record for the greatest number of jumps in a minute is 367! That's more than six jumps a second! How close do you think you can get to that number? If you're going to try to break the record, it might be important to figure out how jump rope length affects your success. Try your hand at this skipping science fair project and jump-start your chances for a jump rope record.

Objective

Determine the best length for a jump rope.

Introduction

Watch DragonflyTV doubledutch video presented by pbskidsgo.org, and see how Francesca, Precious, and Marnicka investigate which of their senses are important for jumping rope.

Did you know that jumping rope is great exercise? Professional boxers do it to improve their coordination, which is the ability to make smooth and accurate movements involving different body parts, and to improve their endurance, which is the length of time for which someone can do a physical activity without stopping.

Plus, jumping rope can be a lot of fun! That's easy to see in the DragonflyTV video on the right, where Francesca, Precious, Marnicka, and their friends show off their double-Dutch skills while investigating the science of jumping rope. In double Dutch, there are two jump ropes being turned, by two people, while one or more people jump the ropes while doing tricks. One of the hard parts is knowing when the ropes are coming, which made Francesca, Precious, and Marnicka decide to investigate whether it was hearing the ropes or seeing the ropes that made them able to be successful at double Dutch. What do you think their experiment revealed? Watch the video to find out, and to see all their great jumping tricks!

In addition to jump rope tricks, there are also competitions for speed jumping. In 2007, the United States record for the most jumps per minute was 367! How many jumps per minute can you make? Do you think that the length of the jump rope might change how many jumps you could make in a minute? The longer the rope, the more time it takes to turn it in a full circle. Shorter ropes turn faster, but because the circle is smaller, you might have to jump higher to get over the rope, and that might slow you down or cause you to make a mistake. So, to help you get started on your own personal best jumps-per-minute count, try this science fair project to determine the best jump rope length and get a scientific jump on your competition!

Terms, Concepts and Questions to Start Background Research

\* Coordination

\* Endurance

Questions

\* Why is jumping rope a good exercise?

\* Why does it take more time to complete a full circle when swinging a long jump rope than a short jump rope?

Materials and Equipment

\* Jump ropes (1 8-foot rope and 1 10-foot rope); available at sporting goods stores

\* Volunteers who know how to jump rope (3, including yourself)

\* Stopwatch or watch with a second hand

\* Lab notebook

\* Graph paper

Experimental Procedure

1. To start this science fair project, you'll need to find three people who know how to jump rope. You will each be jumping rope by yourselves—not double Dutch for this experiment.

You can include yourself as one of the three people.

2. If you or one of your friends would like to take part in the experiment, but don't know how to jump rope, the Dr. Jump website has a good method for learning how.

2. Fold the 8-foot-long jump rope in half to find the midway point. Have the jumper stand on this point with both feet, put a handle in each hand, and pull the handles straight up along his or her sides. Have a helper shorten the jump rope, using the following directions, until the handles are between the jumper's belly button and armpits. This is the short jump rope length.

1. To make the jump rope shorter, the helper should tie knots just beneath the handles. Try to tie the same number of knots beneath each handle. Tie as many knots as needed to make the rope the right length.

2. If the 8-foot jump rope is too short to reach midway between the jumper's belly button and armpits, use the 10-foot-long jump rope instead.

3. When the jump rope is at the right length and the jumper is ready to begin jumping, three things need to happen:

1. The jumper should yell "Go!" and begin jumping.

2. As soon as the jumper says "Go!", a second person should start the stopwatch.

3. A third person should count the number of successful jumps over the rope the jumper makes.

4. The jumper should continue to jump rope for 1 minute, at which point the person with the stopwatch should yell "Stop!" so that the jumper and the counter both know to stop their tasks.

1. If the jumper "messes up," the stopwatch should not stop. The jumper should continue jumping rope, time continues, and the person counting should keep counting up instead of restarting the count. For example, if after 10 successful jumps, the rope hits the jumper's foot and he or she has to restart, the counter should count the next successful jump as number 11.

5. Record the number of successful jumps in a data table

6. Once the jumper has rested long enough to catch his or her breath, he or she should repeat steps 3 and 4 twice more for a total of three trials with that jump rope length.

7. Using the same method as in step 2, re-adjust the jump rope length so that the tips of the handles are now just barely brushing the same jumper's armpits. This is the medium jump rope length.

8. The jumper should repeat steps 3-6 using the medium jump rope length. Record the number of successful jumps in the data table.

9. Now, using the same method as in step 2, re-adjust the jump rope length so that the tips of the handles just barely brush the jumper's chin. This is the long jump rope length.

10. The jumper should repeat steps 3-6 using the long jump rope length. Record the number of successful jumps in the data table.

11. Repeat the whole procedure (steps 2-11) for the other two jumpers. Remember to record the number of successful jumps in the data table.

12. For each jumper, calculate the average number of successful jumps for each jump rope length.

1. For example, to calculate the average number of successful jumps that jumper #1 made using the short jump rope, add up the data for trial #1, trial #2, and trial #3, then divide by the total number of trials (which is 3).

13. Using the graph paper, make three bar graphs, one for each jumper, showing the average number of successful jumps for each jump rope length.

1. Label each bar so you know what it represents.

2. If you prefer to make your bar chart on the computer, try using Create a Graph .

14. Look at your graphs. For each jumper, which jump rope length resulted in the most successful jumps over the rope in 1 minute? Which jump rope length was least successful? Was it the same for each jumper?